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EXAMINER	
MUTSCHLER, BRIAN L	

ART UNIT	PAPER NUMBER
1753	6

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Please find below and/or attached an Office communication concerning this application or proceeding.

AS 6

Office Action Summary	Application No.	Applicant(s)	
	10/035,107	GONSIORAWSKI, RONALD C.	
	Examiner	Art Unit	
	Brian L. Mutschler	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 November 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *23-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *23-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Comments

1. Applicant's cancellation of claims 1-22 in the response is noted.

2. The objection to the specification, except objection to "Chimasorb 944" as explained below, has been overcome by Applicant's amendment.

3. The objection to claims 1-22 has been overcome by Applicant's cancellation of the claims.

4. The rejection of claims 1-22 under 35 U.S.C. 112, second paragraph, has been overcome by Applicant's cancellation of the claims.

5. The rejections of claims 1-22 under 35 U.S.C. 102 and 35 U.S.C. 103 have been overcome by Applicant's cancellation of the claims.

6. The provisional rejection of claims 9-11, 16 and 17 under 35 U.S.C. 101 has been overcome by Applicant's cancellation of the claims and the express abandonment of Application No. 09/882,593.

7. The provisional rejection of claims 1-8, 12-15 and 18-22 under the judicially created doctrine of obviousness-type double patenting has been overcome by Applicant's cancellation of the claims and the express abandonment of Application No. 09/882,593.

Specification

8. The disclosure is objected to because of the following informalities:

a. In line 2 of Applicant's amendment of the second paragraph on page 10 (page 2 of Applicant's response), please change "0.3 2t. %" to --0.3 wt. %--; and

b. On page 10 at line 8 and all subsequent occurrences, "Chimasorb 944" should be changed to --Chimassorb 944--.

The suggested spelling is consistent with the spelling provided by the manufacturer on their internet site, which can be found at the following address:

http://www.cibasc.com/fibersandtextiles/ebene1.asp?ID_bereich=4

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 23-35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 23 recites the limitation "the properties set forth in Tables I and II of the preceding specification" in lines 6-7. There is insufficient antecedent basis for the limitation "the properties" and "the preceding specification" in the claim. The same applies to dependent claims 24-26. The same phrase also occurs in claim 32 at lines 1-2 and claim 35 at lines 7-8.

Claim 26 is indefinite because it does not further limit the structure of the device recited in claim 23. Claim 26 does not provide any structural details of the solar cell module.

Claim 27 recites the limitation "the ASTM test methods listed in Tables I and II" in lines 13-14. There is insufficient antecedent basis for this limitation in the claim. Furthermore, Tables I and II are not listed in the claim. The same applies to dependent claims 28-30. The same phrase also occurs in claim 31 at lines 10 and 18-19.

Claim 27 recites the limitation "a melt flow index of 5.5" in line 10. This limitation is indefinite because no units are provided for the flow index. It was assumed that the units for this property should be "dg/min." as shown in Table I on page 9.

The limitations provided in Tables I and II are indefinite because the phrase "typical value" does not positively limit the properties of the ionomer being claimed. The limitations are also indefinite because the ASTM test methods are not clearly defined. The ASTM test methods are standardized tests that are often used to measure physical properties. However, the tests are not definite because they can be altered over time. In order to positively identify the actual test that is used, the actual guidelines constituting the test must be provided in some form.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 23, 24, 26-28 and 35 rejected under 35 U.S.C. 103(a) as being unpatentable over Hanoka (U.S. Pat. No. 5,733,382), herein referred to as US '382, in view of Gonsiorawski et al. (U.S. Pat. No. 5,074,920).

Regarding claims 23, 27 and 35, US '382 discloses a photovoltaic module comprising a plurality of photovoltaic cells **46** disposed between a transparent front panel **42** and a back sheet **50** and encapsulated by a light-transmitting zinc ionomer **44** and **48** (col. 5, lines 27-64; fig. 7). The zinc ionomer **44,48** is an ethylene-methacrylic acid copolymer or ethylene-acrylic acid copolymer (col. 7, lines 59-67). The zinc ionomer is resistant to acid chemical attack and has a melting point of about 95°C (physical properties of the material sold under the trade name Surlyn™ 1702). The physical properties of Surlyn™ 1702 are similar to the physical properties disclosed in Tables I and II. The photovoltaic cells **46** are connected by conductors **47** physically and electrically connected to front and back contacts using solder connections (col. 5, line 42). US '382 discloses using thin solar cells such as those taught by U.S. Pat. No. 5,478,402, which states, "amorphous silicon solar cells and other thin film solar cells are also known equivalents contemplated by this invention" (US '402 col. 1, lines 25-35).

Regarding claim 28, the front support sheet **42** is made of clear transparent glass (col. 5, line 30). Since ceria-doped glass is more expensive, it is only used when UV absorption is required of the front protecting member, which is not necessary in US '382 due to the use of UV absorbers and stabilizers in the ionomer (col. 10, lines 13-18).

The solar cell module disclosed in US '382 differs from the instant invention because US '382 does not disclose the following:

a. Solder using an acidic flux, as recited in claims 23, 27 and 35;

b. The ionomer absorbs no more than 0.3 wt% water, as recited in claims 24, 27 and 35; and

c. A melt flow index of 5.5, a melting point of 95°C, a Vicat softening point of 65°C, a freezing point of 61°C, and an ultimate tensile strength of 5300 psi (MD) and 5100 psi (TD), as recited in claim 27;

Regarding claims 23, 27 and 35, Gonsiorawski et al. disclose the use of "Xersin 2005" fluxing agent, which is comprised of "Pentoate", or mildly activated rosin flux because "they have been found to demonstrate superior thermal aging properties" (col. 4, lines 19-42).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the solder used in the module of US '382 to use a solder flux as taught by Gonsiorawski et al. because the solder flux has superior thermal aging properties.

Regarding claims 24, 27 and 35, US '382 does not disclose the water absorption properties of the Surlyn™ 1702. Since Surlyn™ 1702 is similar to Surlyn™ 1705-1 and has similar physical properties, Surlyn™ 1702 would be expected to have a similar water absorption property.

Regarding claim 27, Surlyn™ 1702 has similar physical properties to Surlyn™ 1705-1, which has the physical properties listed in the instant claim. The properties of the Surlyn™ resins are dependent on the molecular weight of each resin and the metal or metal salt added. Surlyn™ 1702 and 1705-1 are both zinc ionomers.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the ionomer in the module of US '382 to use a resin such as Surlyn™ 1705-1 because both ionomers have similar properties and would be expected to function equivalently.

13. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hanoka (U.S. Pat. No. 5,733,382), herein referred to as US '382, in view of Gonsiorawski et al. (U.S. Pat. No. 5,074,920), as applied above to claims 23, 24, 26-28 and 35, and further in view of Hanoka et al (U.S. Pat. No. 5,476,553), herein referred to as US '553.

US '382 and Gonsiorawski et al. describe a photovoltaic module having the limitations recited in claims 23, 24, 26-28 and 35, as explained above in section 12.

The module described by US '382 and Gonsiorawski et al. differs from the instant invention because they do not disclose the use of a rear sheet made of polyvinyl fluoride polymer

US '553 discloses the use of a Tedlar™ (polyvinyl fluoride polymer) sheet or a glass sheet as a backing member for a photovoltaic module of the type claimed in the instant invention (col. 9, line 65 to col. 10, line 8).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the module described by US '382 and Gonsiorawski et al. to use a Tedlar™ back sheet, as taught by US '553, because using a Tedlar™ sheet would provide a significant weight reduction over a module having a glass back sheet and are known to be functionally equivalent.

14. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hanoka (U.S. Pat. No. 5,733,382), herein referred to as US '382, in view of Gonsiorawski et al. (U.S. Pat. No. 5,074,920), as applied above to claims 23, 24, 26-28 and 35, and further in view of in view of Hanoka (U.S. Pat. No. 6,320,116), herein referred to as US '116.

US '382 and Gonsiorawski et al. describe a photovoltaic module having the limitations recited in claims 23, 24, 26-28 and 35, as explained above in section 12. US '382 discloses using thin solar cells such as those taught by U.S. Pat. No. 5,478,402, which states, "amorphous silicon solar cells and other thin film solar cells are also known equivalents contemplated by this invention" (US '402 col. 1, lines 25-35).

The module described by US '382 and Gonsiorawski et al. differs from the instant invention because they do not disclose the use of monolithic connections.

US '116 discloses a photovoltaic module using encapsulated photovoltaic cells, wherein the cells are connected using a monolithic connections (col. 3, lines 4-8).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the connections described by US '382 and

Gonsiorawski et al. to use monolithic connectors as taught by US '116 because using monolithic connectors would simplify the fabrication of the photovoltaic modules.

15. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hanoka (U.S. Pat. No. 5,733,382) in view of Gonsiorawski et al. (U.S. Pat. No. 5,074,920) and Hanoka (U.S. Pat. No. 6,320,116), as applied above to claim 29, and further in view of in view of Hanoka et al. (U.S. Pat. No. 6,353,042) and Hanoka (U.S. Pat. No. 6,320,116), herein referred to as US '042.

US '382 and Gonsiorawski et al. describe a photovoltaic module having the limitations recited in claim 29, as explained above in section 14.

The module described by US '382, Gonsiorawski et al. and US '116 differs from the instant invention because they do not disclose the use of cadmium telluride and CIGS cells, as recited in claim 30.

US '042 discloses an encapsulated photovoltaic module using thin film cells comprised of materials such as amorphous silicon, CIGS or cadmium telluride (col. 6, lines 19-59).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified semiconductor layer in the photovoltaic module described by US '382, Gonsiorawski et al. and US '116 to use thin film cells or cells made from CIGS or cadmium telluride, as taught by US '042, because thin film CIGS and cadmium telluride photovoltaic cells are capable of producing energy using sunlight in a manner equivalent to amorphous silicon.

16. Claims 31-34 rejected under 35 U.S.C. 103(a) as being unpatentable over Hanoka (U.S. Pat. No. 5,733,382) in view of Gonsiorawski et al. (U.S. Pat. No. 5,074,920), French (U.S. Pat. No. 4,287,382) and Pern (U.S. Pat. No. 6,093,757).

US '382 discloses a method for forming a photovoltaic module comprising the following steps (col. 7, lines 21-45):

a. Providing an array of interconnected silicon solar cells **46** on top of the sheet **44**, wherein each photovoltaic cell **46** has a front light-receiving surface and a rear surface with contacts **47** attached to the front and rear surfaces and soldered into place;

b. Providing front and back support sheets **42, 50**, wherein the sheets are transparent and stiff;

c. Placing an ionomer encapsulating sheet **44** over front glass plate **42**, the ionomer sheet **44** has a melting point of about 95°C;

d. Placing the array of interconnected solar cells **46** on sheet **44**;

c. Placing a second ionomer encapsulating sheet **48** on the interconnected array of solar cells **46**;

d. Placing a back support sheet **50** on the second ionomer encapsulating sheet **48**;

e. Heating the module **40** in a heated vacuum press to "melt or at least soften...the various surfaces"; and

f. Cooling the module to bond the adjacent components.

Regarding claim 31, US '382 teaches, "the resulting sandwich is heated under vacuum to a suitable temperature" and the module **40** is heated in a vacuum press to "melt or at least soften...the various surfaces" (col. 9, lines 21-27; col. 7, lines 39-45).

Regarding claims 31-33, Surlyn™ 1702 would be expected to have similar water absorption properties as Surlyn™ 1705-1 since they are both zinc ionomers having other similar physical properties.

Regarding claim 34, the front support sheet **42** disclosed by US '382 is made of clear and transparent glass (col. 5, line 29). Ceria-doped glass, a more expensive alternative, is only used when UV absorption is required of the front support, which is not the case in the module of US '382 that uses UV absorbers and UV stabilizers added to the ionomer encapsulant (col. 10, lines 13-18).

The method disclosed in US '382 differs from the instant invention because US '382 does not explicitly disclose a method wherein acidic flux is used, the temperature is 120°C-130°C and the pressure is 390-400 torr, a scrim layer is inserted immediately following the layer of solar cells.

Gonsiorawski et al. disclose the use of "Xersin 2005" fluxing agent, which is comprised of "Pentoate", or mildly activated rosin flux because "they have been found to demonstrate superior thermal aging properties" (col. 4, lines 19-42).

French discloses a method for producing a solar cell module wherein a scrim layer is inserted between the encapsulating sheets "in an attempt to provide for

complete removal of air prior to the lamination of the sheets of encapsulant" so bubbles do not form in the finished product (col. 1, lines 53-62).

Pern discloses a method for forming an encapsulated solar cell module and states, "conventional lamination procedures generally require about 8-10 minutes at 120°C" (col. 4, lines 34-38).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the solder used in the module of US '382 to use a solder flux as taught by Gonsiorawski et al. because the solder flux has superior thermal aging properties.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of US '382 to use a scrim sheet, as taught by French, because using a scrim sheet would "provide for complete removal of air prior to the lamination of the sheets of encapsulant" (col. 1, lines 53-62).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the temperature used in the method of US '382 to use a temperature of about 120°C to 130 °C and a pressure appropriate for the processing of zinc ionomer as taught by Pern because such a temperature and pressure would sufficiently soften the ionomer of US '382 (melting point ~95°C) while reducing the cost to heat the module to higher temperatures.

Response to Arguments

17. Applicant's arguments with respect to claims 1-22 have been considered but are moot in view of the new ground(s) of rejection.

18. Applicant suggests, "there is nothing in the Hanoka '382 patent that indicates that the SURLYN 1702 ionomer is functionally equivalent to the SURLYN 1705-1 ionomer" (see page 11 of Applicant's response). Applicant further states that the example provided for the SURLYN 1702 uses a temperature of 170-180°C, and "nor is there anything in Hanoka '382 to suggest that the lamination procedure may occur at a lower temperature."

19. In US '382, Hanoka does not provide the physical properties of Surlyn™ 1702. However, Hanoka does state, "the Surlyn 1702 ionomer offers the advantage of excellent hot tack strength. Of course, various other ionomer products may also be used" (col. 8, lines 6-15). Evidence for the equivalence of the Surlyn™ resins is provided on the website of DuPont, which is found at http://www.dupont.com/industrial-polymers/surlyn/H-80035-1.html and a copy of which is provided.

> DuPont *Surlyn*® brand resins are unique ionomer-class molding and extrusion materials created from DuPont proprietary acid copolymers. Starting with selected molecular weight grades of copolymers such as ethylene/methacrylic acid, DuPont adds zinc, sodium, lithium or other metal salts. Acid neutralization results in the formation of ion clusters (hence the general term, "ionomer") within the resulting polymer matrix. *Surlyn*® resins incorporate many of the performance features of

the original ethylene-based copolymers, such as chemical resistance, melting range, density, and basic processing characteristics. However, *Surlyn*® resin performance is significantly enhanced in such areas as:

- low temperature impact toughness;
- abrasion resistance/scuff resistant;
- chemical resistance;
- transparency/clarity;
- melt strength;
- direct adhesion of epoxy and polyurethane finishes; and
- direct adhesion to metal, glass, and natural fibers by heat lamination.

Table 1 - Selected Properties of *Surlyn*®

Property	Value Range	Test Method
Specific Gravity	0.94 - 0.97	ASTM D 792
Hardness (Shore D)	36 - 68	ASTM D 2240
Flex modulus (room temp, kpsi)	4.3 - 75	ASTM D790 Proc B
Tensile strength (kpsi)	2.3 - 5.4	ASTM D 638
Elongation at break (%)	285 - 770	ASTM D 638
Melt flow index (g/10 min.)	0.7 - 20.0	ASTM D 1238
Vicat softening point (°C)	47 - 74	ASTM D 1525-70
Melting point (°C)	70 - 100	DSC*
Freeze point (°C)	38 - 75	DSC*
Optical haze (0.25 in.(6.4 mm))	1.3 - 27	ASTM D1003A

*As determined by differential scanning calorimetry

As can be seen in Table 1, all Surlyn™ resins have physical properties lying within a narrow range. Since Surlyn™ 1702 and Surlyn™ 1705-1 are both

zinc based ionomers, it would be reasonable to expect these resins to have similar properties and to function in a similar manner.

20. Regarding the temperature used to laminate the module, in US '382 Hanoka teaches, "the resulting sandwich is heated under vacuum to a suitable temperature" and the module **40** is heated in a vacuum press to "melt or at least soften...the various surfaces" (col. 9, lines 21-27; col. 7, lines 39-45). Hanoka only provides the temperature range of 170-180°C as an example for manufacturing. Since Surlyn™ has a melting point around 95°C, it would be reasonable to expect that a lower temperature, such as 120-130°C would be sufficient to "melt or at least soften" the ionomer.

21. Applicant's statements on page 13 of the response regarding the numbers of the ionomers does not provide any support for the argument since it has been clearly determined that both Surlyn™ 1702 and 1705-1 are both zinc ionomers.

Conclusion

22. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (703) 305-0180. The examiner can normally be reached on Monday-Friday from 8:00am to 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (703) 308-3322. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

NAM NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

blm
December 2, 2002